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GROWTH EXPERIMENT OF ORGANIC METAL CRYSTAL IN LOW GRAVITY M-21

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The purpose of this experiment is to grow large, high-quality single crystals of the organic metal (TMTTF-TCNQ) by the diffusion method without thermal fluctuation due to convection and gravitational sedimentation, and to evaluate the difference in properties between such crystals grown in low gravity and the ones obtained on Earth.

The expected results may fix several physical properties of TMTTF-TCNQ, lead to the discovery of new phenomena, and enable us to analyze diffusion processes in a precise way. The result will contribute to the development of research on organic metals and, generally, on crystal growth.

Outline of Flight Experiment

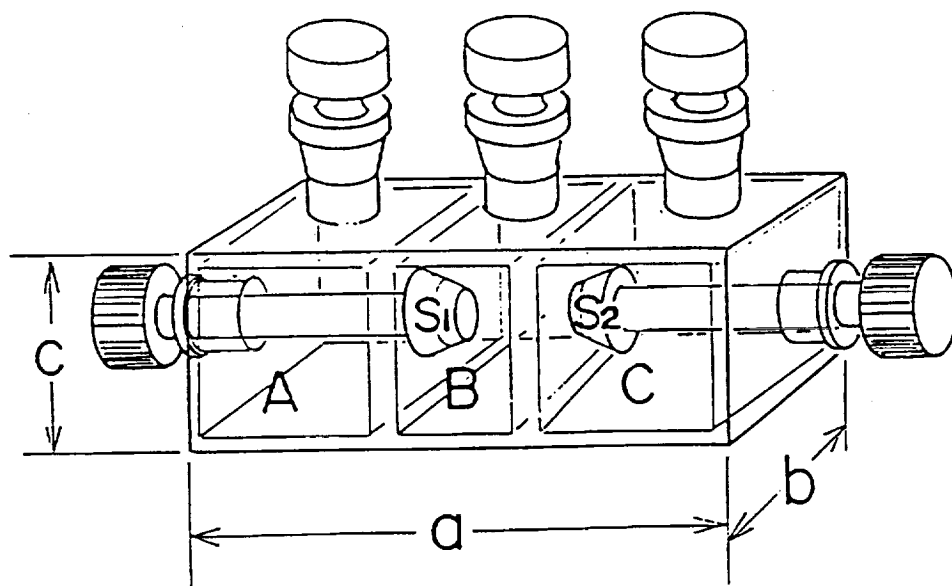
The crystal growth apparatus for operation on the space shuttle is composed of three adjoining chambers each equipped with cocks. One side chamber is filled with the anisole solution of electron acceptor, TCNQ, the other side chamber is filled with the anisole solution of electron donor, TMTTF, and the center chamber is filled with pure anisole and seed crystals. When the space shuttle enters a state of microgravity, both side cocks are opened simultaneously, and from both side chambers, TMTTF and TCNQ molecules enter into the center chamber, react with each other, and produce the complex TMTTF-TCNQ. After a concentration of the complex

reaches saturation, crystals form around the seed crystals, growing by pure diffusion in microgravity. The physical properties of these space-grown crystals will be evaluated and compared with the properties of crystals grown on the Earth.

Solvent : $C_6H_5OCH_3$

Donor : $C_{10}H_{12}S_4$ (TMTTF)

Acceptor : $C_{12}H_4N_4$ (TCNQ)



Dimension (mm)

	Small Cell	Large Cell
a	42	102
b	16	34
c	16	54

Figure 1. Crystal growth cell for organic metals.

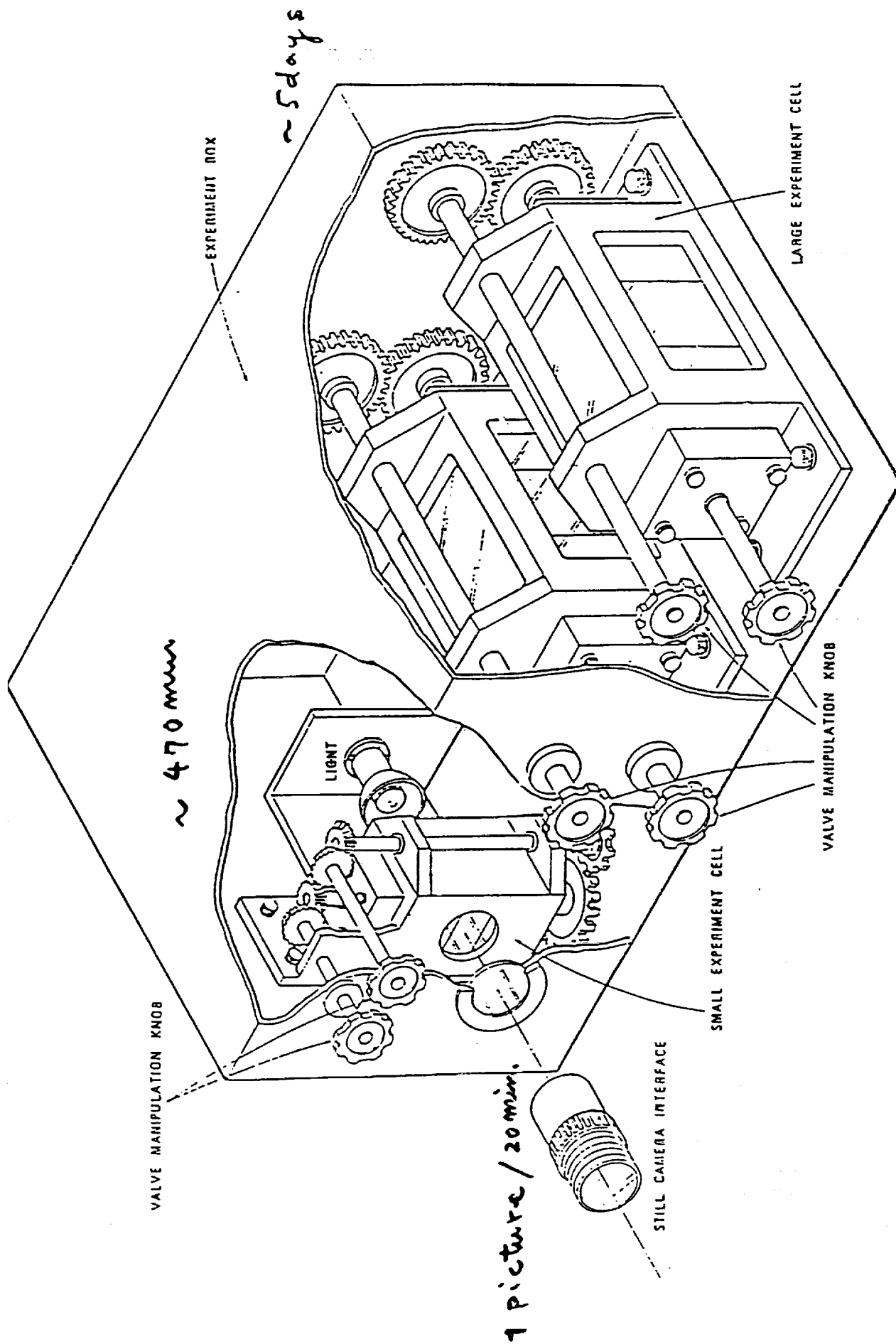


Figure 2. Organic Crystal Growth Experiment Facility concept.